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CA 2309853 A1 2001/11/29

(21) **2 309 853**

(12) **DEMANDE DE BREVET CANADIEN
CANADIAN PATENT APPLICATION**

(13) **A1**

(22) Date de dépôt/Filing Date: 2000/05/29

(41) Mise à la disp. pub./Open to Public Insp.: 2001/11/29

(51) Cl.Int.⁷/Int.Cl.⁷ G06F 17/60

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(54) Titre : SYSTEME DE REPARTITION DES TITRES EFFICACE SUR LE PLAN FISCAL

(54) Title: TAX-EFFICIENT ASSET ALLOCATION SYSTEM

(57) Abrégé/Abstract:

The present invention generates a risk/return efficient portfolio, consisting of assignment of investments or managed money investments representing selected asset classes to taxable and tax-sheltered (deferred) investment accounts (as applicable to the individual investor), such that overall tax payable on the combined account(s) is minimized. Tabular or graphical representation of the appropriate risk/return/tax efficient investment mix assigned to taxable and/or tax sheltered investment account(s) (as appropriate or necessary) matching the investment background and risk tolerance of an investor or range of investors is displayed.



TAX-EFFICIENT PORTFOLIO OPTIMIZATION SYSTEM

ABSTRACT

The present invention generates a risk/return efficient portfolio, consisting of assignment of investments or managed money investments representing selected asset classes to taxable and tax-sheltered (deferred) investment accounts (as applicable to the individual investor), such that overall tax payable on the combined account(s) is minimized. Tabular or graphical representation of the appropriate risk/return/tax efficient investment mix assigned to taxable and/or tax sheltered investment account(s) (as appropriate or necessary) matching the investment background and risk tolerance of an investor or range of investors is displayed.

FIELD

The present invention relates to a method/system for selecting for an investor an appropriate risk/return/tax efficient allocation of a plurality of assets to a portfolio divided between taxable and tax-sheltered investment accounts and for the display of such optimal allocation graphically or alphanumerically, simultaneously across taxable and tax-sheltered accounts.

BACKGROUND

Investors constructing portfolios of assets inside their taxable and/or sheltered account(s), consisting of mutual funds, stocks, bonds, T-bills or other of numerous various asset classes typically seek to maximize the expected or mean rate of return of the overall portfolio for a given level of risk or volatility, frequently defined in terms of variance of return and based either on historical data or projected expected rates of return utilizing techniques known to persons skilled in portfolio management or economic modeling.

Utilizing Markowitz's classical mean-variance efficient frontier or Sharpe's inclusion of the risk-free asset in the mean-variance model, or any other suitable risk/reward optimization technique by those experienced in the field of asset allocation and subsequent generation of the efficient frontier or a matrix of risk/return values, an appropriate optimized investment portfolio can be selected offering the highest return/reward for a given level of risk/volatility suitable for an investor of a particular risk tolerance level.

Classical modern portfolio theory (MPT) and other sophisticated asset allocation models are academic models based on tax-free investment rates of return. In fact, one of the underlying assumptions of MPT is the absence of tax. These useful and powerful theories are utilized and applied to the practical world in the management of investment portfolios with the objective of maximizing return and minimizing risk of investment portfolios designed for the investor's individual return objectives and tolerances for portfolio risk or volatility.

From a practical standpoint investment portfolios are immediately or ultimately subject to tax (in most cases, under most taxation regimes), whether the investment assets are held in taxable accounts or in tax-sheltered accounts. Not only this, but certain investment assets are taxed more favourably than others. In the field of finance investments that are taxed at lower rates and/or taxed only upon disposition, are referred to as tax-advantaged while those taxed at higher rates and/or when they generate income are referred to as tax-disadvantaged. Contributing to the effective tax-advantage or disadvantage of a particular investment asset that usually has to be considered, in practice, is the timing of the taxation of investment assets. For example, an equity asset can usually grow in value indefinitely and not be subject to tax until it is disposed of, while interest income from interest bearing investments is generally taxed annually, at unfavourable tax rates. The interest-bearing asset can only be prevented from generating taxable income on a regular basis by being placed into a tax-sheltered plan. The equity asset may be tax-advantaged therefore for two reasons: 1. A lower taxation rate, and 2. An innate sheltering from tax thus allowing a tax-free compounding of its market value.

Tax-disadvantaged investments are therefore usually best held in tax-sheltered investment accounts where the earnings can compound rather than generate immediate taxes that reduce the funds available for re-investment.

Astute investors will find that even investments or investment income that are taxed at favourable rates, for example muni-bonds (in the US) or preferred shares (in Canada) should often be held

inside tax-sheltered accounts as opposed to inside taxable accounts, to prevent loss of the potential compound earnings on the annual taxes saved.

Since a tax-advantaged investment may not be perfectly tax-efficient over very long investment holding periods, say over 40 years, it may on certain occasions be favourable to hold tax-disadvantaged investments outside tax-sheltered plans to replace the tax-advantaged investments usually held outside. The compound growth of the "not perfectly" tax-efficient tax-advantaged investment(s) held inside the sheltered account and an equal amount of the tax-disadvantaged investment(s) held in the taxable account, over time may exceed the growth-after-tax- of the tax-disadvantaged investment(s) being held in taxable accounts and the equal amount of tax-disadvantaged investment(s) held in a sheltered account. Over very long periods of time the compound growth of the taxes saved on an inefficient tax-advantaged investment may supercede its innate tax advantage.

In most situations tax-advantaged investments such as stocks or equity mutual funds, or exchange-traded funds are sufficiently tax-efficient and tax-advantaged when compared to tax-disadvantaged investments such as certificates of deposit to allow an investor to make the general assumption that tax-disadvantaged investments should be held in sheltered accounts and tax-advantaged outside.

In this tax-efficient optimization system a test for true long-term tax-efficiency of each investment in comparison to each other investment, although not essential, should be conducted to ensure appropriate assignment to taxable or sheltered account.

For the above reasons one can see that there is a wide gap between academic theory and its advanced risk/reward optimization techniques and the practical minimization of an investor's taxes. This gulf has not been bridged despite practical application of sophisticated asset allocation methodologies to institutional and individual investment portfolios. The present state of the art is focussed and centered on the generation of optimal investment portfolios that match investor risk tolerance, but that do not account for after-tax investment returns. Usually asset allocation portfolios representing ranges of risk/return optimizations are frequently categorized as "low," "medium," or "high" risk portfolios, suitable for "conservative," "moderate" and "aggressive" investors. These allocation recommendations are applied to both taxable and tax-sheltered investment accounts in an identical fashion, with no inclusion of, or reference to, the tax implications of those recommendations, nor are suitable adjustments made to reduce tax on the overall portfolio. Investors may not even contemplate, nor have any control over the tax implications of the particular asset allocation investment product that they are purchasing such as an asset allocation mutual fund or a balanced mutual fund (which is also an asset allocation fund), since the fund will be invested as is, in either a taxable or tax-sheltered account, or both, once again without any reference to tax, or the ability to make adjustments to reduce overall tax.

Some advisors provide model portfolios recommended for taxable and tax-sheltered accounts. However, the investment allocations for both taxable and tax-sheltered accounts, given an investor's risk/return optimization are invariably identical. Even in the situation where an advisor differentiates between taxable and tax-sheltered portfolios to adjust for after-tax returns in the taxable portfolio, the recommendations for either portfolio are performed in isolation, and do not attempt to simultaneously allocate across all accounts. The division between taxable and tax-sheltered accounts in the investor's overall portfolio needs to be considered in conjunction with the risk/reward optimization before the allocations can be apportioned to minimize tax across the overall portfolio and not just on one side of the overall portfolio, i.e. the taxable side.

Another deficiency in the present practice of asset allocation is the recommendation of portfolios that are tax-efficient, generally by way of a "hands-on" assignment of appropriate assets to applicable taxable or tax-sheltered accounts by the financial advisor, leading to an overall portfolio that is tax-efficient but that lacks risk-reward optimization. Assignment of assets to portfolios is generally accomplished through financial advisors while optimization of investment assets is usually the domain of academics. Thus, advisors seeking both tax-efficiency and risk/reward efficiency, do not have a formal process enabling them to optimize portfolios vis-à-vis risk, return and tax.

The present invention addresses these difficulties by providing a system that combines academic portfolio theory with practical tax planning. In addition, the present process incorporates another fundamental principal in finance, namely, the time value of money. As stated in the claims, the tax-efficiency of the overall sheltered and taxable accounts is taken over a number of periods, the fixed investment period, automatically accounting for the effects of compounding returns. Traditional asset allocation models not only allow tax disadvantaged investments to be placed in taxable accounts without consideration of potential placement of those investments to tax-sheltered accounts, but they do not consider the potential compounding earnings that could be made if those taxes paid on the tax-disadvantaged investments were tax sheltered.

Tax sheltered and taxable portfolio management covers but is not limited to the following types of investment strategies and investment accounts: cash or investment accounts, pension plans including RRSPs, RRIFs, RESPs, investment component of universal life insurance policies. The asset allocation decision in terms of today's state of the art tends to allocate solely for the particular account that is under consideration, for example an RRSP account, or a RRIF account, or for a taxable brokerage account. Optimization with reference to risk/return for the risk tolerance of the investor is most likely achieved, but the tax implications are unfortunately ignored due to the construction of either the asset allocation program or the product itself. For example, balanced mutual funds do not easily facilitate practical tax minimization. A balanced mutual fund cannot be split so that the interest bearing investments can be transferred to the tax-sheltered plan, while the equity investments are transferred to the taxable plan.

In fact, one could go so far as to say that with the present state-of-the-art only investors solely holding tax-sheltered investment accounts, containing assets producing income and withdrawals treated equally for tax purposes do not need to be concerned about the tax-efficiency. Those investors owning any investments held outside tax-sheltered plans and employing any state of the art asset allocation system or model will most likely pay more tax than need be given a particular level of risk tolerance. Specifically they most likely will be paying tax on their interest bearing investments at a higher rate and frequency than on lower tax rate equity investments taxed only on disposition. Factors not accounted for in traditional risk/reward optimizations.

Another deficiency one notes with the present practice of asset allocation is in the presentation of suitable asset recommendations for investors. The standard format, whether the media be brochures, computer software or programs, models displayed on web-sites, or other mediums of display or computation, is to present pie charts or similar means of visual or alphanumeric display detailing suitable weighting of asset classes or investment mix, either for each of an investor's taxable and tax-sheltered accounts; or to simply present a "suitable" mix or allocation of investment assets for the investor's complete portfolio, without consideration of the magnitude of the two types of accounts. Investment selection for the investor's accounts then takes place through selection of one or more of these "model" portfolios, or of investments representing these models. Unfortunately for the reasons mentioned earlier in this text these recommendations are, most probably, not tax-efficient, except in the one case of an investor holding only a tax-sheltered

account. Another observation that should be noted is that even in the situation of an investor solely holding a taxable account the recommended asset allocation is most likely not optimal since careful comparison of the advisor's recommended taxable and tax-sheltered accounts invariably illustrates identical allocations for both. Therefore, the recommended portfolio most likely will not lie on the efficient frontier due to the different after-tax return of the investments held in a taxable account versus a tax-sheltered one. In addition, most likely it will not provide effective tax-minimization.

The present invention provides not only a system to provide risk/reward/tax efficient portfolios, but an effective means of display, neither of which has been addressed by existing asset allocation models.

SUMMARY OF THE INVENTION

The present invention is a system, method and/or process to create and display investment portfolios for investors that are risk/return and tax efficient. In other words, the objective is to assign and display weightings of various investments, representing selected asset classes, to portfolios that maximize return over time for a given level of risk, while simultaneously minimizing taxes on the investor's overall portfolio-whether it comprises taxable, sheltered, or both taxable and sheltered accounts. The system, process and method can utilize forms, computer programs or hardware, the Internet (World Wide Web) or other suitable mediums through which the system, method and/or process can be implemented, utilized and displayed.

Data is input representing rates of return of selected investment assets, then modern portfolio theory and/or other techniques employed by those experienced in the investment management field are used to generate an efficient frontier or array of portfolios representing the highest expected/projected returns for given risk levels. Based on the risk tolerance levels of various investors "ideal" matching tax-sheltered portfolios consisting of the appropriate mix of the investment assets are produced. These "ideal" portfolios provide the template from which the suitable overall asset allocation for both taxable and sheltered portfolios will take place.

After-tax return data representing rates of return of the same selected investment assets is input. The investor's time frame and the exact tax treatment of the returns will affect the after-tax rates of return. MPT and/or other techniques employed by those experienced in the investment management field is/are used to generate an efficient frontier or array of portfolios representing the highest expected/potential returns for given risk levels. Based on risk tolerance levels of various investors' ideal matching taxable portfolios consisting of the appropriate mix of the investment assets are produced.

Prior to assignment of investment assets to taxable and sheltered accounts in accordance with the investor's optimal asset mixes for taxable and sheltered portfolios, the weighting of these respective accounts to the investor's overall portfolio is calculated. The size of the investor's sheltered account in relation to the investor's overall portfolio, and the ratio of the tax-disadvantaged assets in the "ideal" portfolio place a constraint on the assignment of tax-disadvantaged assets to the tax-sheltered portfolio. Prior to assignment, as applicable, of the tax-disadvantaged assets, a test of the tax-efficiency of the tax-advantaged assets is made. Based on the investor's time frame and the tax-efficiency of the investment(s) over that time frame, a comparison between the return of the investment inside a tax-sheltered plan and outside is made. This is done to account for the chance that even a tax-advantaged investment may do worse outside a tax-sheltered plan if the loss of growth on the taxes paid on the tax-advantaged

investment(s) over the investor's time period exceeds the higher-taxed growth inside. In most cases this will not be the case. In the situation that it is, however, the tax-advantaged investment will be assigned on a priority basis to the tax-sheltered plan.

In the most common assignment, that of the tax-disadvantaged investment(s) to the tax-sheltered account, the ratio of the tax-disadvantaged investment(s), calculated earlier in the ideal portfolio (a value between zero and one), is subtracted from the weighting of the tax-sheltered account to the investor's overall portfolio (a value between zero and one). If the resultant is positive, the full value of the tax-disadvantaged investment is assigned to the tax-sheltered account and the shortfall of content in the tax-sheltered plan is provided by assignment of the tax-advantaged investment. If the resultant is negative, in other words there is an excess of the tax-disadvantaged assets that cannot be assigned to the tax-sheltered account, it is necessary for them to be assigned to the taxable account employing the results for the optimal taxable account. This is achieved by multiplying the ratio of the excess tax-disadvantaged investment(s) to the size of the taxable account with the ratio of the tax-disadvantaged investment(s) to tax-advantaged investment(s) selected from the after-tax array of portfolios. The balance of the taxable account will consist of the tax-advantaged investment(s).

Once the optimal allocations have been ascertained, the present invention provides a technique of display for respective investors, either in chart or alphanumeric form, of both their recommended taxable and tax-sheltered/deferred accounts, that automatically imbeds the most effective investment/asset assignment from a taxation standpoint.

It is accordingly an object of the present invention to overcome the limitations of the known art and to provide an asset allocation method that accounts for the tax implications of tax-advantaged, tax-disadvantaged investments, both inside and out of taxable and sheltered (deferred) investment portfolios.

It further is an object of this invention to simultaneously display for both investor's taxable and tax-sheltered accounts, either graphically or alphanumerically, charts that effectively "imbed" tax-efficiency into a risk/return optimization for investors of varying risk tolerances (and time-horizons).

It further is an object of this invention to provide and/or display tax/risk/return efficient portfolios for investors who solely own taxable or tax-sheltered (deferred) accounts.

It further is an object of this invention to provide a system/process of optimization for all asset classes and investment account types. These investment accounts could include, but would not be restricted to, RRSPs/RRIFs, RESPs, universal life insurance, and other tax shelters.

It further is an intention of this invention to provide graphical display of taxable and tax-sheltered accounts that provides comparative sizing of the investor's respective accounts. For example, if the investor has equally sized taxable and tax-sheltered accounts the simultaneously displayed accounts would be of equal size. If the investor has a tax-sheltered account that is twice as large as his taxable account the size of graphical representation of the tax-sheltered account will be twice the size of the taxable account.

It is, however, not an intention of this invention to be restricted by this method of display. Equal sized charts representing taxable and sheltered accounts, even if they are not of equal monetary size, may be desired. This will in no way effect the essential nature of the charts to imbed tax-efficiency into risk/reward efficient portfolio displays.

GLOSSARY OF TERMS

Asset – refers to an investment, usually classified as either cash, bond(debt) or equity (stock)

Exempt – refers to an investment or account that avoids tax completely. An example could be the investment account of a life insurance policy that grows without taxation and pays out tax-free upon death of the insured

Investment- refers to property in which money is invested, can include assets such as cash, bonds, equities, mutual funds, pooled funds, and other managed money accounts

Investor – any person, partnership, corporation or any entity committing money to an investment portfolio.

Managed money – any portfolio of money that is professionally managed and invested – includes products and services such as mutual funds, unit trusts, wrap accounts, pooled funds, pension funds.

MPT – abbreviation for modern portfolio theory.

Sheltered investment/account- any investment or account that tends to defer, shelter, reduce or eliminate tax.

Note that the word sheltered and tax-sheltered have the same meaning throughout this application

Taxable account – refers to an account that offers no means of tax sheltering to the investments held within it, although some of those investments may have their own innate tax-sheltering ability.

Tax-advantaged investments – are generally those that have an innate ability to defer tax, or are taxed at preferential rates. The most common type of tax-advantaged investment would be an equity or common stock. However it is possible for even tax-advantaged investments to have tax-disadvantaged income, such as dividends.

Tax-disadvantaged investments – are generally those that do not have an ability to defer tax, and/or are taxed at higher tax rates. Bonds generally pay interest that is taxable, in most regimes, annually at high rates, with little or no possibility of deferral.

Tax-efficiency – a measure of the ability of an investment or account to maximize after-tax return. The more tax-efficient it is the higher the after-tax return.

Tax-shelter – refers to the ability for an investment strategy or investment to defer, shelter, reduce or eliminate tax. RRSPs, RRIFs, IRAs and 401Ks are examples of tax shelters. An extreme, but never-the-less important tax-shelter would be an exempt investment such as the investment side of an universal life-insurance policy that shelters earnings growth and pays out tax-exempt.

DIAGRAMS

Brief description of diagrams

FIG. 1 depicts the prior art method for displaying recommended "model" taxable (cash/investment accounts) and tax-sheltered accounts (registered/tax-exempt) or portfolios

FIG. 2 depicts simultaneously optimized risk/return/tax efficient taxable and tax-sheltered accounts

FIG. 3 is a flow chart of the system, method and process used to arrive at the optimized investment portfolio(s)

FIG. 4 depicts two alternative visual displays of tax-efficient asset allocation models

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

The foregoing features of the invention will be more readily understood with reference to the following detailed description taken with the accompanying diagrams.

The present invention is a system, process and/or method for optimizing from a risk/return perspective an investor's entire investment portfolio whether it be invested in tax-sheltered, taxable, or any mixture of these two types of accounts. Additionally the procedure could be used to tax-efficiently assign assets to sheltered/deferred and taxable accounts on a stand-alone basis without reference to modern portfolio theory or other commonly utilized techniques of portfolio optimization or risk/reward management. In traditional asset allocation models, the assignment of selected investment asset is often indicated through display of particular investment account, usually taxable, sheltered, or neither. FIG 1 shows some typical "models". 10, 30 and 50 show conservative, moderate and aggressive models for taxable plans (accounts). 20, 40, 60 show conservative, moderate and aggressive models for tax-sheltered/deferred plans (accounts). 70, 80 and 90 show conservative, moderate and aggressive models without consideration of type of plan or account. These models, although perhaps risk/reward efficient in a world without taxation, in no way consider the after-tax returns of the various investment assets in their assignment to taxable and sheltered/deferred accounts, resulting in overall portfolios that are not tax-efficient.

FIG. 2, 100 and 110 (together), 120 and 130 (together), 140 and 150 (together) show simultaneously optimized risk/return/tax-efficient taxable and sheltered/deferred accounts for conservative, moderate and aggressive investors respectively. 160 shows a traditional asset allocation for an investor (of moderate risk tolerance level) with only a taxable account. 170 shows a tax-efficient allocation for the same investor. (Note the increase in weighting of equity, tax-advantaged, assets and decrease in weighting of cash/bonds due to the higher after-tax return of the equity allocation versus 160). 180 shows traditional asset allocation for a moderate investor with only sheltered/deferred accounts. For that same investor 190 shows a tax-efficient allocation. There is no difference in percentage allocation in this case, as there is no opportunity for this investor to preferentially allocate some of his tax-advantaged investments to taxable accounts.

Note that in these diagrams the magnitude of the various accounts is not signified.

The first step of any asset allocation procedure is an assessment of the investors' 200 profile, 210 in FIG 3. The investor, with his/her individual and unique respective investment profile answers

questions to ascertain an appropriate mix of investment assets. This is done through electronic means (computer, Internet), paper-based questionnaire or other appropriate means 220. Based on the investor's risk tolerance and tax situation an appropriate assignment of investment assets will be made. Before this stage is reached, the tax-efficiency of the potential investment assets that the investor will select from must be determined.

In most circumstances it is fairly clear and obvious as to which investments can be classified as tax-advantaged and which can be tax-disadvantaged. For example stocks, are generally tax-advantaged investments, and bonds are usually classified as tax-disadvantaged investments. However, over time, and due to what is commonly called "tax-inefficiency" it is possible for stocks to become less tax-efficient than bonds, and to be better held inside a tax-sheltered account. To ensure that under any circumstances the correct labeling of the selected investment assets as either tax-advantaged or disadvantaged the following methodology can be used, 230:

I) For the fixed investment period a calculation of the total after-tax portfolio return where the "tax-advantaged" investment is held in a taxable account and an equal value of the "tax-disadvantaged" investment asset is held inside a sheltered account is made. II) The same calculation, switching both investment assets to the other account is made.

The portfolio with the highest return represents the appropriate priority of assignment of investment assets to type of account. It may also indicate a necessary reclassification of the former "tax-advantaged" investment to that of "tax-disadvantaged" investment and vice-versa.

Suitable formulae for steps I and II to facilitate prioritization of investment asset assignment are:

$$\begin{aligned} \text{I.} & \quad [1 * (1 + R_{Ad})^T - (1 * (ACB_{AT})^T - ACB_{AT}) * M] + [(1 * ((1 + R_B)^T - ACB_{BT})) * (1 - M)] \\ \text{II.} & \quad [1 * (1 + R_B)^T - (1 * (ACB_{BT})^T - ACB_{BT}) * M] + [(1 * ((1 + R_A)^T - ACB_{AT})) * (1 - M)] \end{aligned}$$

Where:

R_A = (annual) return on "tax advantaged" investment inside tax-sheltered account
 R_{Ad} = (annual) after-tax return (in taxable account) of "tax-advantaged" investment
 R_B = (annual) before-tax return (in sheltered account) of tax-disadvantaged investment
 R_{Bt} = (annual) after-tax return (in taxable account) of tax-disadvantaged investment
 ACB_{BT} = adjusted cost base of "tax-disadvantaged" investment at time T
 ACB_{AT} = adjusted cost base of "tax-advantaged" investment at time T
 M = investors' applicable tax rate at time T
 T = investor's time horizon

Note: the initial value for both investment A & B is assumed to be 1 and each investment initially has no unrealized capital gains

Note: after this prioritization the asset found to be best assigned to the sheltered account will be called the tax-disadvantaged asset and the asset found to be best assigned to the taxable account the tax-advantaged asset.

Using data of the before-tax rates of return, 240 characterizing the universe of assets considered to comprise a portfolio an efficient frontier or matrix of risk/reward optimized assets is generated. This generation of the efficient frontier is in accordance with one of the underlying assumptions of MPT, namely, no taxes.

A second efficient frontier or matrix of risk/reward optimized assets is generated using MPT or other technique of risk/reward optimization utilized by those skilled in the art, this time factoring in the adjusted rates of return for the universe of assets on an after-tax rate of return, 240. The calculation of the after-tax return should match the investor's time frame. For example, the after-tax rates of return of tax-advantaged and tax-disadvantaged investments will vary with the tax-advantaged becoming more favourable over a longer period of time due to the increased potential of growth of the taxes deferred. An equity asset can grow in value and not attract taxes on its increase in capital until it is disposed of, while an interest bearing asset usually forces an investor to pay annual tax on the interest. Taxes paid on the interest bearing assets are funds that cannot be utilized for future growth.

Based on a particular investor's risk tolerance level and investment time horizon a suitable portfolio is selected from the first efficient frontier or optimized matrix. This selection represents the ideal risk/reward optimization in the unreal world of no taxation. From this point on the preferred embodiment of this invention is essentially adjusting this "ideal" to fit the real world where taxation plays a vital role in influencing the best allocation of investment assets across an investor's taxable and sheltered accounts. Based on what a particular investor's risk tolerance level and investment time horizon a suitable portfolio is selected from the second efficient frontier or optimized matrix. The asset mix and yield for this optimal portfolio will differ from the first due to the difference in tax treatment of the different asset classes.

In the instance that an investor has only taxable or sheltered account(s), he/she will move directly to the respective taxable optimization 280 and sheltered optimization 270 suitably displayed, 250 and 260, respectively.

The allocation to concurrently best fit the assets to both sheltered and taxable accounts for the situation of the investor with both sheltered/deferred and taxable accounts takes place, moving first to 270 and then to 280 in Fig.3.

The following algorithms, or other means derived by a person skilled in the art, are used to ascertain the weighting of investments to the investor's tax sheltered and taxable accounts as indicated in 270 and 280:

$T = t/(t+s)$ and $S = s/(t+s)$, where T = proportion of taxable account with respect to his/her entire portfolio

S = proportion of sheltered account with respect to his/her entire portfolio

t = value of taxable account

s = value of sheltered account

Tax disadvantaged assets are first assigned to the tax-sheltered accounts; excess tax-disadvantaged investments are then assigned to the unsheltered account according to the following process/formulae:

$$\text{if } S < d, \text{ then } d_t = 1 \ \& \ a_t = 0 \ \& \ d_s = (d-S)/T \cdot (d_t/d) \ \& \ a_s = (1 - d_t)$$

where:

a_s = weighting of tax-advantaged assets in sheltered accounts
 a_t = weighting of tax-advantaged assets in taxable account
 d_s = weighting of tax-disadvantaged assets from step b in claim 1,4,7,10,13
 d_t = weighting of tax-disadvantaged assets in sheltered account
 d_t = weighting of tax-disadvantaged assets in taxable accounts
 d_s = weighting of tax-disadvantaged assets in after-tax optimization from step d in claim 1,4,7, 10,13

In the situation where weighting of the tax disadvantaged investment (s) from step b in claim 1 (4,7,10,13) is equal to or less than the proportion of the tax-sheltered account with respect to the entire portfolio, the tax-advantaged investments will be assigned to the balance of the tax-sheltered account and the entire taxable account according to the following process and formulae.

if $S \geq d_s$, then $d_t = d_s / S$ & $a_s = (1 - d_t)$ & $a_t = 1$ & $d_s = 0$

The resultant optimized taxable and deferred accounts are then displayed either graphically or alphanumerically 290. For a particular risk tolerance level and ratio of taxable to tax-sheltered accounts and after using the aforementioned methodology, or other technique derived by those skilled in the art, the resultant portfolio (s) are concurrently displayed in a graphical format such as a pie chart representing the assignment of the assets to both the accounts as shown in Fig. 2. In the event that the investor(s) has/have only one account (ie taxable or sheltered) suitable optimizations, for a given risk level, will be displayed only for taxable or sheltered accounts. Those skilled in the art will appreciate that there are many methods for suitably displaying the resultant portfolios.

The resultant portfolios can consist of assignment of combinations of investment assets (mutual funds, pooled funds, wraps, segregated funds and individual investment assets), 300, as optimized above, to match investor investment objective, or could consist of a series of pre-existing tax-efficient optimal portfolios intended to match a wide range of various investor objectives. Much in the same way that countless financial institutions have set up series of fixed "model portfolios" of funds to match a wide range of investor profiles, a series of tax-efficient model portfolios utilizing this methodology and encompassing investors' sheltered and/or taxable accounts could be arranged.

To typify with an example, say an investor has a portfolio consisting of a sheltered account of \$150,000 and a taxable account of \$200,000, has a moderate risk tolerance indicating a preferred bench mark asset allocation consisting of a mix of 10% cash, 20% bonds(debt) and 70% equity, to produce the greatest return for a given risk level. Traditional asset allocation models would usually assign asset weightings of 0.10 cash, 0.20 bonds and 0.70 equity to each of his accounts. In dollar terms this translates into \$15,000, \$30,000, \$105,000, of cash, bonds, equity respectively for his sheltered account and \$20,000, \$40,000 and \$140,000 of cash, bonds, equity respectively for his taxable account.

Using the aforementioned tax-efficient optimization method/process/system and assuming this investor was determined, using MPT or other risk/reward optimization technique, to have an optimal "risk/reward" sheltered account consisting of weighting mix of 0.10/0.20/0.70

(cash/bond/equity) and an optimal risk/reward taxable account weighting mix of 0.08/0.16/0.76, then the optimal risk/reward/tax efficient portfolio using the methodology and algorithms above, would consist of a weighting mix of 0.23/0.47/0.30 (cash/bond/equity) to his sheltered account and 0/0/1 (cash/bond/equity) to his taxable account. These results in dollar terms would translate into a sheltered account of \$34,500/70,500/45,000 (cash/bond/equity) and a taxable account of \$200,000 equity

The disclosed method for optimizing investment portfolios may be implemented as a computer program product or as a paper-based work sheet or through other appropriate means, for example over the Internet, to produce the resultant portfolio in a manner suitable to be utilized by an end user.

The implementation may include, but not be restricted to a series of computer instructions fixed either on a hard-drive or server or a medium such as a diskette, CD-ROM, (ROM or fixed disk)

A preferred embodiment of the present invention includes the visual or alphanumeric display of the optimized taxable and tax-sheltered/deferred portfolios (as applicable), Fig 4. 310 and 320 (together) show tax-efficient optimization without indicating magnitude of taxable and sheltered accounts, while 330 and 340 (together) show magnitude of accounts.

Unlike traditional asset allocation models that do not consider taxation, and therefore display recommendations that are only risk/reward efficient, this present invention not only provides a solution to the investor's quest for a risk/reward efficient portfolio, it illustrates, either graphically or alpha-numerically, the appropriate risk/reward/tax efficient recommendations simultaneously across all investment accounts (as applicable). The recommended asset allocation effectively imbeds tax-efficiency into the recommended asset allocation. Additionally, this imbedded tax-efficiency is not only with respect to either sheltered or taxable accounts but, simultaneously across all accounts.

The principal features and advantages are thus apparent from the steps in the above flow charts over the present system of asset allocation pertaining to taxable and sheltered accounts, and thus, it is intended that all such features and advantages of the instant invention fall within the true spirit and scope of the present invention for optimizing investors' investments in risk/reward/tax-efficient portfolios across taxable and sheltered accounts, a process with unique, novel and creative attributes. Modifications and variations will readily occur to those skilled in the art, and it is not the intention of the present invention to be limited to the exact construction and operation as illustrated and described herein.

CLAIMS

What is claimed is

1). A method for enabling investors to simultaneously select for both taxable/unsheltered and tax-sheltered/deferred accounts a value of portfolio weight for each of a plurality of assets that optimizes across all accounts for risk minimization, return maximization and tax minimization, comprising the steps of:

- a) setting of a fixed investment period;
- b) determining the investor's optimal weighting of between one and unity for each of a plurality of asset classes, based on the pre-tax return for each of the assets if held inside a tax-sheltered/deferred account (s) for the fixed investment period;
- c) determining the priority of assignment of various asset classes to taxable or sheltered/deferred account(s) based on superior compounded after-tax return for the fixed investment period;
- d) determining the investor's optimal weighting of between one and unity for each of a plurality of asset classes, based on the after-tax return of the assets if held inside taxable account (s) for the fixed investment period;
- e) priority assignment of tax-disadvantaged investments to tax-sheltered/deferred account(s) wherein the value of the ratio of the tax-disadvantaged investment (s) in the optimal weighting for a tax-sheltered/deferred account derived in step b falling short of the value of the ratio of the tax-sheltered/deferred account(s) in relation to the investor's overall portfolio is assigned to the tax-sheltered/deferred account(s) and any amount exceeding this ratio is assigned to the taxable account(s) in the amount as determined by step f;
- f) excess value of tax-disadvantaged investment(s) assigned to taxable account from step e, as applicable, is scaled in proportion to the ratio of the weighting of the tax-disadvantaged investment(s) from step d divided by the weighting of the tax disadvantaged investment(s) from step b;
- g) assignment of the tax-advantaged investment(s) to the tax-sheltered account(s) wherein there is a fall short amount of the tax-disadvantaged investment(s) assignment to the tax-sheltered/deferred account(s);
- h) excess tax-advantaged investment(s) from step g that cannot be assigned to sheltered accounts is assigned to taxable account(s);

2). The method of claim 1 further comprising the step of determining whether a particular investment is tax-advantaged or tax-disadvantaged, comprising the steps of:

- a). setting of fixed investment period;
- b) determining the combined after-tax return of all combinations of assignment of investments to taxable and sheltered accounts;
- c) combination with highest after-tax portfolio return indicates tax-advantaged investment(s) as those to be held in taxable account(s) and tax-disadvantaged investment(s) as those to be held in sheltered account(s);

3). The method of claim 1 further comprising the step of:

graphic or alpha-numeric representation of the appropriate weighting of each of the plurality of assets to each of the investor's taxable and/or sheltered/deferred account(s) representing risk minimization, return maximization and tax minimization across the investor's complete portfolio of accounts as determined in claim 1, matching the investor's investment profile

4) A system enabling investors to simultaneously select for both taxable/unsheltered and tax-sheltered (sheltered) accounts a value of portfolio weight for each of a plurality of assets that optimizes across all accounts for risk minimization, return maximization and tax minimization, comprising the steps of:

- a) means of setting of a fixed investment period;
- b) means for determining the investor's optimal weighting between one and unity of a plurality of asset classes based on the pre-tax return of the assets if held inside a tax-sheltered/deferred account (s) for the fixed investment period;
- c) means for determining the priority of assignment of various asset classes to taxable or deferred accounts based on superior compounded after-tax return for the fixed investment period;
- d) means for determining the investor's optimal weighting between one and unity of a plurality of asset classes based on the after-tax return of the assets if held inside taxable account (s) for the fixed investment period;
- e) means for priority assignment of tax-disadvantaged investments to tax-sheltered/deferred account(s) wherein the value of the ratio of the tax-disadvantaged investment (s) in the optimal weighting for a tax-sheltered/deferred account derived in step b falling short of the value of the ratio of the tax-sheltered/deferred account(s) in relation to the investor's overall portfolio is assigned to the tax-sheltered/deferred account(s) and any amount exceeding this ratio is assigned to the taxable account(s) in the amount as determined by step f;
- f) means for assignment of excess value of tax-disadvantaged investment(s) assigned to taxable account from step e, scaled in proportion to the ratio of the weighting of the tax-disadvantaged investment(s) from step c divided by the weighting of the tax disadvantaged investment(s) from step b;
- g) means for assignment of the tax-advantaged investment(s) to the tax-sheltered account(s), as applicable, wherein there is a fall short amount of the tax-disadvantaged investment(s) assignment to the tax-sheltered/deferred account(s);
- h) means for assignment of excess tax-advantaged investment(s) from step g that cannot be assigned to sheltered accounts assigned to taxable account(s).

5). The method of claim 4 further comprising the step of determining whether a particular investment is tax-advantaged or tax-disadvantaged, comprising the steps of:

- a). setting of fixed investment period;
- b) determining the combined after-tax return of all combinations of assignment of investments to taxable and sheltered accounts;
- c) combination with highest after-tax portfolio return indicates tax-advantaged investment(s) as those to be held in taxable account(s) and tax-disadvantaged investment(s) as those to be held in sheltered account(s).

6). The system of claim 4 further comprising;

means for graphic or alpha-numeric representation of the appropriate weighting of each of the plurality of assets to each of the investor's taxable and/or sheltered/deferred account(s) representing risk minimization, return maximization and tax minimization across the investor's complete portfolio of accounts as determined in claim 4, matching the investor's investment profile.

7) A computer-implemented system enabling investors to simultaneously select for both taxable/unsheltered and tax-sheltered/deferred accounts a value of portfolio weight for each of a plurality of assets that optimizes across all accounts for risk minimization, return maximization and tax minimization, comprising the steps of:

- a) setting of a fixed investment period;
- b) determining the investor's optimal weighting between one and unity of a plurality of asset classes based on the pre-tax return of the assets if held inside a tax-sheltered/deferred account (s) for the fixed investment period;
- c) determining the priority of assignment of various asset classes to taxable or deferred accounts based on superior compounded after-tax return for the fixed investment period;
- d) determining the investor's optimal weighting between one and unity of a plurality of asset classes based on the after-tax return of the assets if held inside taxable account (s) for the fixed investment period;
- e) priority assignment of tax-disadvantaged investments to tax-sheltered/deferred account(s) wherein the value of the ratio of the tax-disadvantaged investment (s) in the optimal weighting for a tax-sheltered/deferred account derived in step b falling short of the value of the ratio of the tax-sheltered/deferred account(s) in relation to the investor's overall portfolio is assigned to the tax-sheltered/deferred account(s) and any amount exceeding this ratio is assigned to the taxable account(s) in the amount as determined by step f;
- f) excess value of tax-disadvantaged investment(s) assigned to taxable account from step e, scaled in proportion to the ratio of the weighting of the tax-disadvantaged investment(s) from step c divided by the weighting of the tax disadvantaged investment(s) from step b;
- g) assignment of the tax-advantaged investment(s) to the tax-sheltered account(s) wherein there is a fall short amount of the tax-disadvantaged investment(s) assignment to the tax-sheltered/deferred account(s);
- h) excess tax-advantaged investment(s) from step g that cannot be assigned to sheltered accounts assigned to taxable account(s);

8). The method of claim 7 further comprising the step of determining whether a particular investment is tax-advantaged or tax-disadvantaged, comprising the steps of:

- a). setting of fixed investment period;
- b) determining the combined after-tax return of all combinations of assignment of investments to taxable and sheltered accounts;
- c) combination with highest after-tax portfolio return indicates tax-advantaged investment(s) as those to be held in taxable account(s) and tax-disadvantaged investment(s) as those to be held in sheltered account(s).

9). The method of claim 7 further comprising the step of:

graphic or alpha-numeric representation of the appropriate weighting of each of the plurality of assets to each of the investor's taxable and/or sheltered/deferred account(s) representing risk minimization, return maximization and tax minimization across the investor's complete portfolio of accounts as determined in claim 7, matching the investor's investment profile.

10) A computer-implemented system enabling investors to simultaneously select for both taxable/unsheltered and tax-sheltered/deferred accounts a value of portfolio weight for each of a plurality of assets that optimizes across all accounts for risk minimization, return maximization and tax minimization, comprising the steps of:

- a) means for setting of a fixed investment period;
- b) means for determining the investor's optimal weighting between one and unity of a plurality of asset classes based on the pre-tax return of the assets if held inside a tax-sheltered/deferred account (s) for the fixed investment period;
- c) means for determining the priority of assignment of various asset classes to taxable or deferred accounts based on superior compounded after-tax return for the fixed investment period;
- d) means for determining the investor's optimal weighting between one and unity of a plurality of asset classes based on the after-tax return of the assets if held inside taxable account (s) for the fixed investment period;
- e) means for priority assignment of tax-disadvantaged investments to tax-sheltered/deferred account(s) wherein the value of the ratio of the tax-disadvantaged investment (s) in the optimal weighting for a tax-sheltered/deferred account derived in step b falling short of the value of the ratio of the tax-sheltered/deferred account(s) in relation to the investor's overall portfolio is assigned to the tax-sheltered/deferred account(s) and any amount exceeding this ratio is assigned to the taxable account(s) in the amount as determined by step f;
- f) means for assignment of excess value of tax-disadvantaged investment(s) assigned to taxable account from step e, scaled in proportion to the ratio of the weighting of the tax-disadvantaged investment(s) from step c divided by the weighting of the tax disadvantaged investment(s) from step b;
- g) means for assignment of the tax-advantaged investment(s) to the tax-sheltered account(s) wherein there is a fall short amount of the tax-disadvantaged investment(s) assignment to the tax-sheltered/deferred account(s);
- h) means for assignment of excess tax-advantaged investment(s) from step g that cannot be assigned to sheltered accounts, assigned to taxable account(s).

11). The method of claim 10 further comprising the step of determining whether a particular investment is tax-advantaged or tax-disadvantaged, comprising the steps of:

- a). setting of fixed investment period;
- b) determining the combined after-tax return of all combinations of assignment of investments to taxable and sheltered accounts;
- c) combination with highest after-tax portfolio return indicates tax-advantaged investment(s) as those to be held in taxable account(s) and tax-disadvantaged investment(s) as those to be held in sheltered account(s).

12). The method of claim 10 further comprising the step of:

graphic or alpha-numeric representation of the appropriate weighting of each of the plurality of assets to each of the investor's taxable and/or sheltered/deferred account(s) representing risk minimization, return maximization and tax minimization across the investor's complete portfolio of accounts as determined in claim 10, matching the investor's investment profile.

13). A method enabling investors to simultaneously select for both taxable/unsheltered and tax-sheltered/deferred accounts a value of portfolio weight for each of a plurality of managed

money investments that optimizes across all accounts for risk minimization, return maximization and tax minimization, comprising the steps of:

- a) means for setting of a fixed investment period;
- b) means for determining the investor's optimal weighting between one and unity of a plurality of managed money investments based on the pre-tax return of the investments if held inside a tax-sheltered/deferred account (s) for the fixed investment period;
- c) means for determining the priority of assignment of various managed money investments to taxable or deferred accounts based on superior compounded after-tax return for the fixed investment period;
- d) means for determining the investor's optimal weighting between one and unity of a plurality of managed money investments based on the after-tax return of the assets if held inside taxable account (s) for the fixed investment period;
- e) means for priority assignment of tax-disadvantaged managed money investments to tax-sheltered/deferred account(s) wherein the value of the ratio of the tax-disadvantaged managed money investment (s) in the optimal weighting for a tax-sheltered/deferred account derived in step b falling short of the value of the ratio of the tax-sheltered/deferred account(s) in relation to the investor's overall portfolio is assigned to the tax-sheltered/deferred account(s) and any amount exceeding this ratio is assigned to the taxable account(s) in the amount as determined by step f;
- f) means for assignment of excess value of tax-disadvantaged managed money investment(s) assigned to taxable account from step e, scaled in proportion to the ratio of the weighting of the tax-disadvantaged managed money investment(s) from step c divided by the weighting of the tax disadvantaged managed money investment(s) from step b;
- g) means for assignment of the tax-advantaged managed money investment(s) to the tax-sheltered account(s) wherein there is a fall short amount of the tax-disadvantaged managed money investment(s) assignment to the tax-sheltered/deferred account(s);
- h) means for assignment of excess tax-advantaged managed money investment(s) from step g that cannot be assigned to sheltered accounts, assigned to taxable account(s).

14). The method of claim 13 further comprising the step of determining whether a particular managed money investment is tax-advantaged or tax-disadvantaged, comprising the steps of:

- a). setting of fixed investment period;
- b) determining the combined after-tax return of all combinations of assignment of investments to taxable and sheltered accounts;
- c) combination with highest after-tax portfolio return indicates tax-advantaged investment(s) as those to be held in taxable account(s) and tax-disadvantaged investment(s) as those to be held in sheltered account(s).

15). The method of claim 13 further comprising the step of:

graphic or alpha-numeric representation of the appropriate weighting of each of the plurality of managed money investments to each of the investor's taxable and/or sheltered/deferred account(s) representing risk minimization, return maximization and tax minimization across the investor's complete portfolio of accounts as determined in claim 13, matching the investor's investment profile.

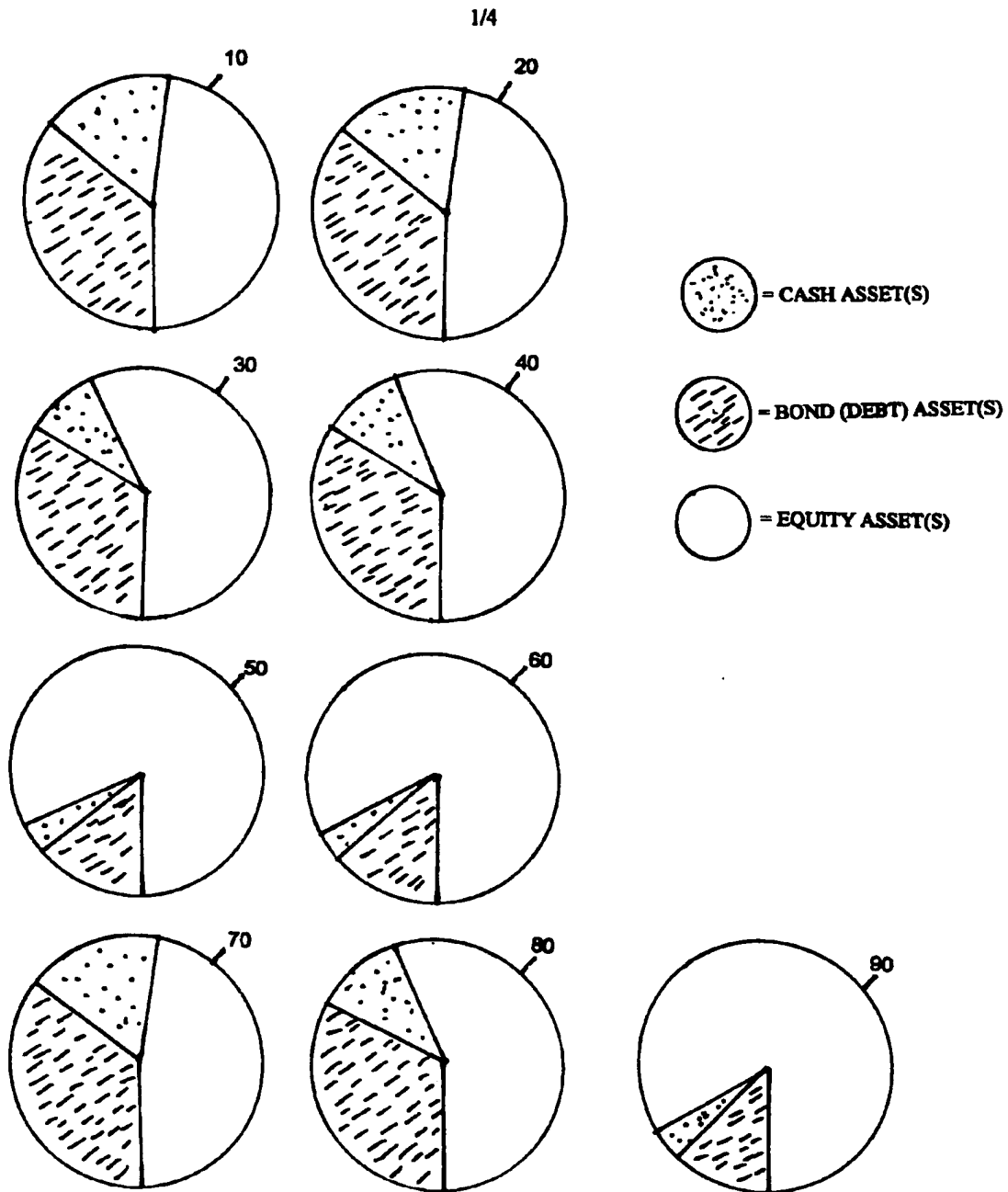
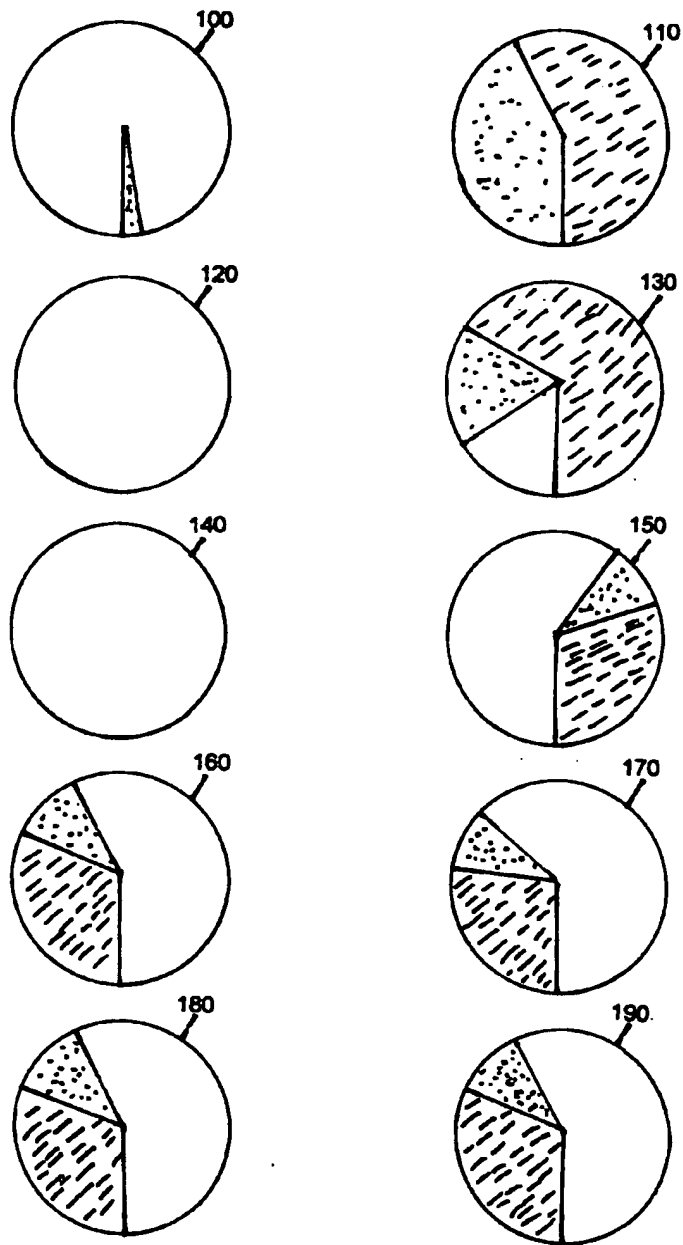


FIG. 1

2/4



3/4

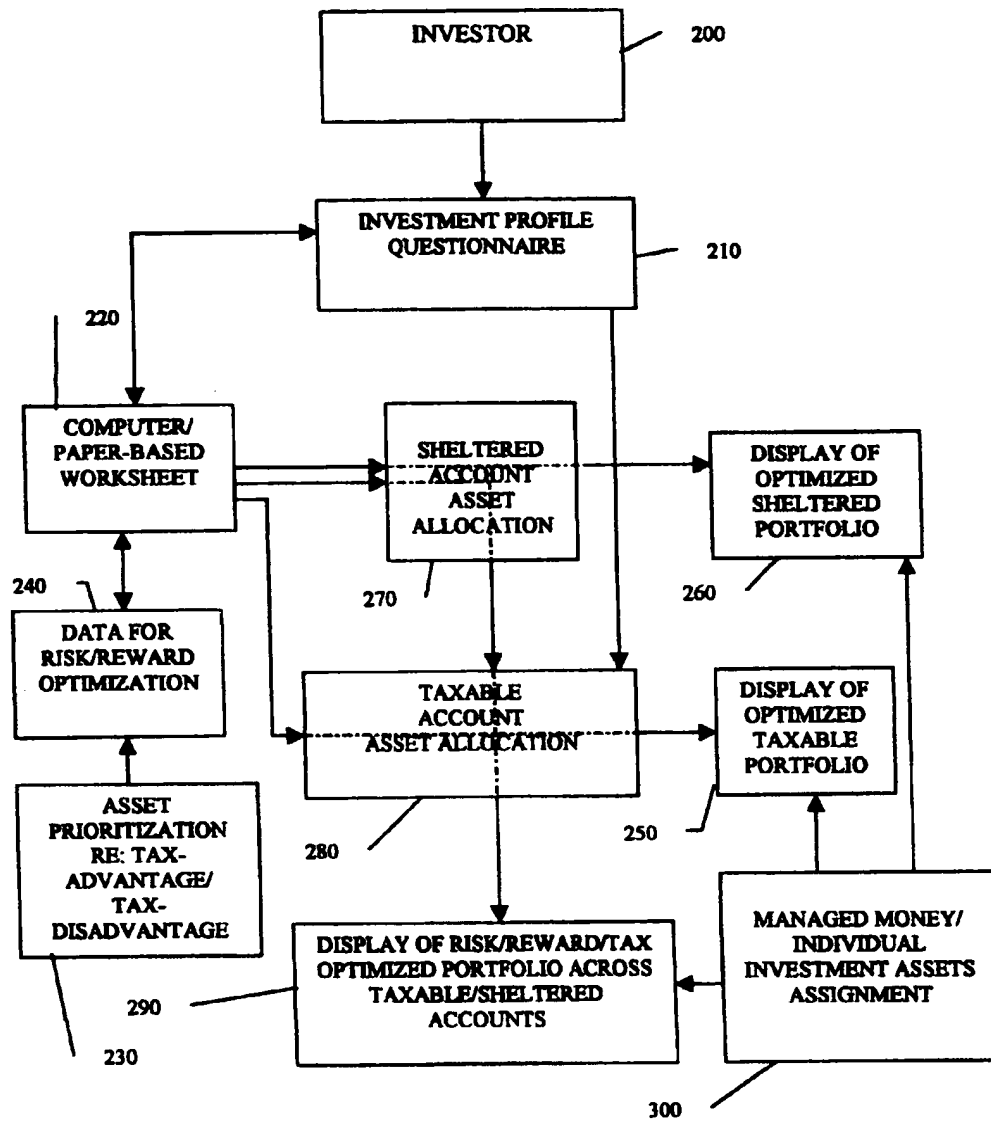


FIG. 3

4/4

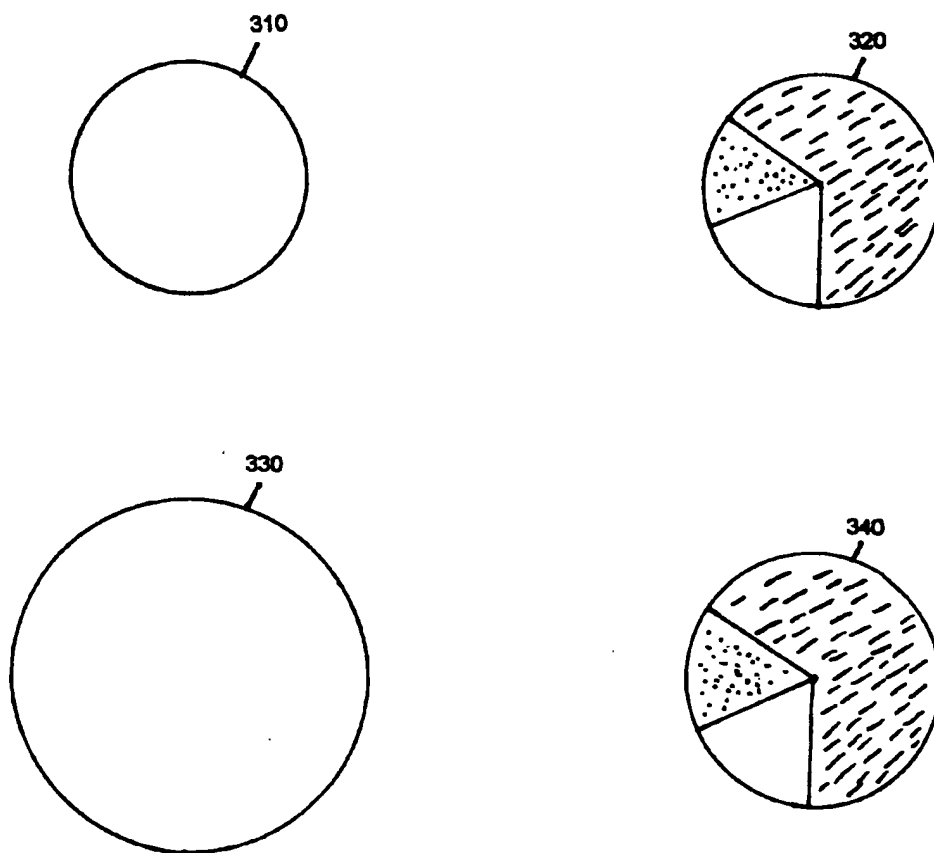


FIG. 4